Technical Memorandum
South Lake Union Streetcar Project

Project Description

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Prepared for:
The City of Seattle Department of Transportation

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Introduction

The City of Seattle, in cooperation with the U.S Department of Transportation Federal Transit Administration (FTA), proposes to construct a new streetcar line serving the downtown, Denny Triangle and South Lake Union areas of Seattle. This line would provide local transit service, connect to the regional transit system, accommodate economic development, and contribute to neighborhood vitality. The proposed South Lake Union Streetcar would begin in the vicinity of the intersection of Westlake Avenue and Olive Way/5th Avenue in downtown Seattle (see Figure 1) It would extend north through the Denny Triangle and South Lake Union neighborhoods and terminate in the vicinity of Fairview Avenue N. and Ward Street near the Fred Hutchinson Cancer Research Center. The line would connect these neighborhoods and destinations with the regional transit hub at Westlake Center, which will be a major connection point for light rail, buses and monorail. The length of the proposed streetcar line is approximately 1.3 miles in each direction (2.6 track miles total).

Alignment

The southern terminus of the South Lake Union Streetcar line would be on Westlake Avenue between Olive Way and Stewart Street. The station at the southern terminus would be located on the sidewalk on the east side of Westlake Avenue. The southern terminus would be served by a single track that operates in a dedicated streetcar lane in one of the existing northbound lanes. A double track would be provided north of 6th Avenue.

The streetcar would operate in both directions on two tracks in Westlake Avenue from 6th Avenue to Thomas Street. At Thomas Street the northbound track would turn east for one block to Terry Avenue N., where it would continue north on the west side of Terry Avenue N. to Mercer Street. At Mercer Street, the line would cross to the east side of Terry Avenue N. in order to maintain two-way traffic operations on Terry between Mercer and Valley streets. The southbound track would continue on the west side of Westlake Avenue North from 6th Avenue to Valley Street.

At Valley Street, both tracks would turn east into the existing railbank on the north side of Valley Street. Where Valley Street meets Fairview Avenue N., the two tracks would cross the westbound lanes on Fairview Avenue N. and straddle the center lane in the street. The line would terminate between Ward Street and Yale Avenue N. at the Fred Hutchinson Cancer Research Center.

The tracks and stops are expected to be constructed entirely within existing right-of-way and no acquisition is anticipated. (See Section 3.6 for Maintenance Base information.)

Initially, the streetcar is expected to operate for 15 hours per day (roughly 6 AM to 9 PM). The system will run with two cars, with fifteen minutes between cars. Ultimately, the system is expected to operate for 18 hours per day (roughly 5 AM to 11 PM), with three cars in service and ten minutes between cars.

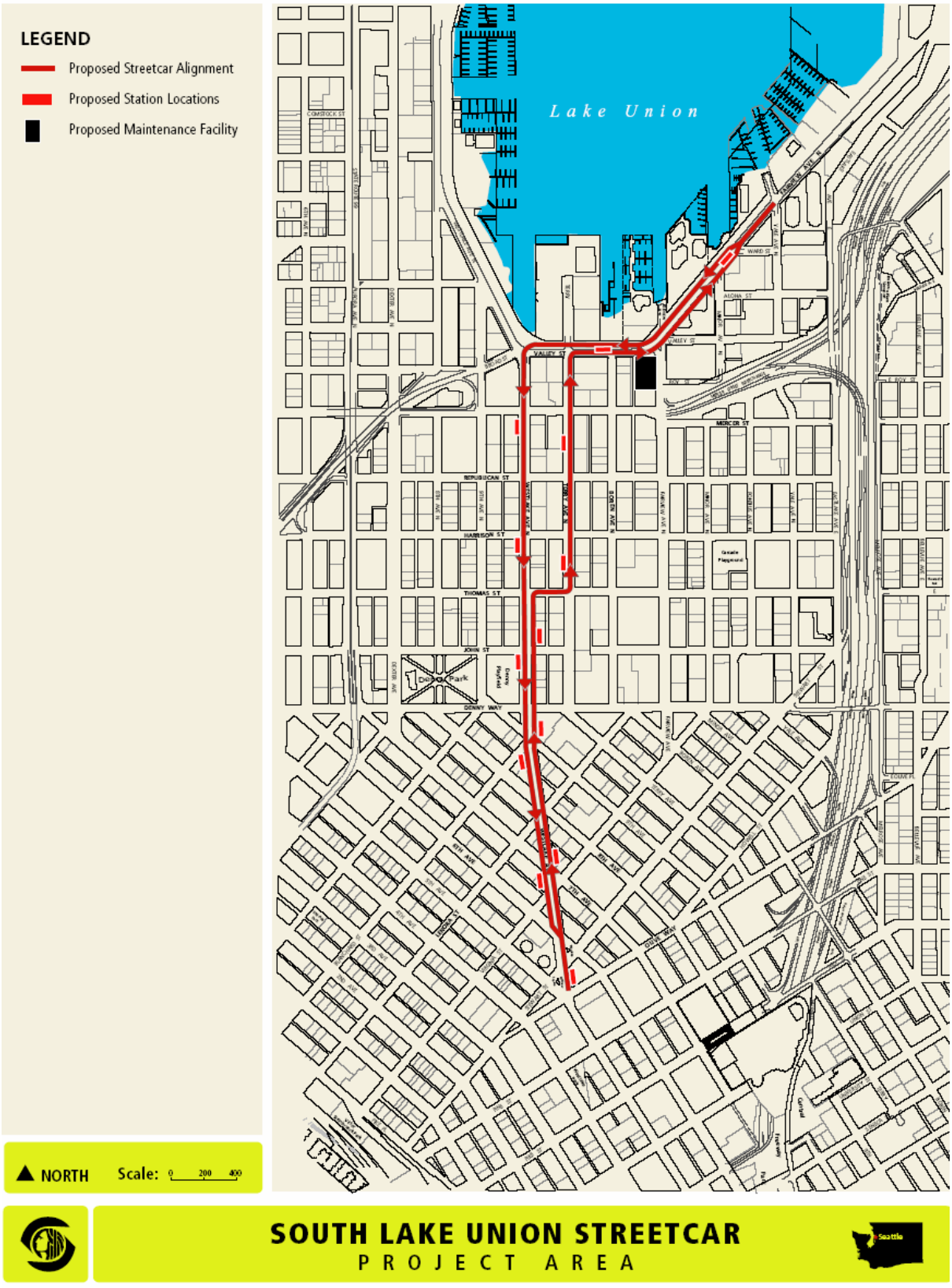

Figure 1: Project Area

Street and Intersection Configuration

The streetcar would generally operate in mixed-flow traffic with in-lane operation (i.e. it would share a travel lane with other traffic). This project assumes the conversion of Westlake Avenue N. to two-way operations from 9th Avenue (just south of Denny Way) to Valley Street. Terry Avenue N. would be one-way northbound between Thomas and Mercer streets and two-way between Mercer and Valley streets. All other project area streets would remain in their existing configuration. Some on-street parking along Westlake Avenue N. between Denny Way and Mercer Street would be removed to convert the street to two-way operation. Other impacts to on-street parking would be minimal.

Traffic signals and channelization would be modified at several intersections. These intersection changes would include new signals at the intersections of Fairview Avenue N. and Ward Street, Valley Street/Terry Avenue N., and Mercer Street/Terry Avenue N. The existing signal at Valley Street and Fairview Avenue N. would be modified to accommodate the daily streetcar movements in and out of the maintenance base. Northbound and southbound left-turn pockets on Westlake Avenue N. would likely be added at Valley, Mercer, Republican and/or Harrison streets and at Denny Way. At Denny Way, widening within the existing right-of-way of both the northbound and southbound approaches of Westlake Avenue may be required. Minor widening within the existing right-of-way may also be needed for the northbound approach of Westlake Avenue North at Mercer Street. In places, the roadway could be reconstructed from curb to curb.

Streetcar Stops

Streetcar stops would generally be provided as side-platform corner-curb bulbs located within the parking lane at the far side of an intersection. Two stops would be center platform configurations: one within Fairview Avenue N. at the Fred Hutchinson campus and one north of Valley Street adjacent to South Lake Union Park. Stops would be approximately 1,000 feet apart, with stops at intersections that provide pedestrian access to existing public attractions, proposed new developments and other transit stops. Stations are currently proposed at:

- Westlake Avenue at 5th Avenue and Olive Street (southern terminus)
- Westlake Avenue at 7th Avenue and Virginia Street
- Westlake Avenue at 9th Avenue and Blanchard Street (just south of Denny Way)
- Westlake Avenue N. at John Street
- Westlake Avenue N. and Terry Avenue N. at Harrison Street
- Westlake Avenue N. and Terry Avenue N. at Mercer Street
- Valley Street railbank area at South Lake Union Park
- Fairview Avenue N. at Ward Street (northern terminus)

Prototypical stop components would include concrete corner-curb bulbs, signage and rider information, trash receptacles, and shelters (see Figure 2). Shelters would be optional where building sidewalk canopies exist. Typical shelters would consist of a glass roof supported by

a single metal column. Corner-curb bulbs and a portion of the adjoining sidewalk would be graded or re-graded to meet platform access requirements.

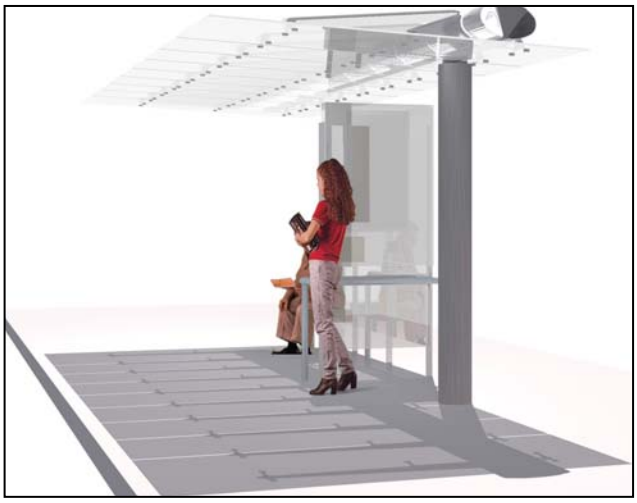

Figure 2: Station Prototype

Vehicle and Propulsion Technology

The proposed vehicle type is a bi-directional, low-floor, single-car, articulated streetcar (Figure 3 shows one type available). The typical streetcar vehicle is 66 feet long and 8 feet wide. The vehicle runs on standard gauge tracks, is 11.5 feet high, and is classified as a low-floor vehicle. Low-floor vehicles have support equipment (HVAC, air compressor, resistor banks) mounted at roof level.

Figure 3: Example Streetcar Vehicle Type

The streetcar would be powered by an overhead electrical system, similar to those used by streetcars in cities such as Tacoma, Washington and Portland, Oregon. Three traction power substations would be located generally in the areas of the southern terminus, the intersection of Westlake and 9th streets, and the new maintenance facility. These facilities would be approximately 15 feet by 10 feet in area and would distribute power to the overhead contact wire. This wire would power the vehicles through a trolley pole or pantograph. Tubular poles (approximately 24 feet high) and lightweight cantilevers or

span wires would support the overhead wires. A comprehensive protection system would shut down the electrical network in the event of faults on the utility or streetcar systems.

Maintenance Facility

A maintenance facility is also planned as part of the project. The proposed location is at the southwest corner of Fairview Avenue North and Valley Street. The lot for the facility is approximately 32,000 square feet in size. The maintenance facility building would be approximately100 x 70 feet, with 9,000 square feet of usable space. The shop floor would have 5,000 square feet of workspace and two 100-foot-long tracks fitted with pits and platforms for repair work. Two additional tracks would be designated as yard storage tracks and would be at least two vehicles in length. Approximately 4,000 square feet of office space on two levels would be provided for offices, employee areas, support shop equipment, and storage space.

The maintenance facility would maintain the initial fleet on a daily basis and would have the capacity to maintain and store up to seven streetcars to accommodate future expansion. The maintenance facility would be used primarily for daily vehicle maintenance and inspections, as well as minor repairs. Heavy repairs and periodic major maintenance would be performed off site.

Stormwater Detention

The project would involve constructing up to five new stormwater detention facilities per the City of Seattle Municipal Code 22.800, also known as the Stormwater, Grading, and Drainage Control Code. The detention facilities would be located within separate sub-basins in the South Lake Union drainage basin and would discharge to the existing combined sewers.

Construction

The typical construction method for the streetcar track system would involve removal of the top 12 to 18 inches of pavement and replacement with rail-embedded reinforced concrete slabs within a trackway trench approximately eight feet wide. The construction process is similar to street repaving and would include:

- Removing of existing pavement,
- Placing track rails in their appropriate alignment and profile,
- Pouring and curing concrete in the trench
- Matching track slab to existing pavement
- Re-striping the roadway, and
- Reopening that section of roadway to traffic.

Construction of the maintenance facility could require up to 6 feet of excavation for the structure and track facilities, with augured piles of up to 40 feet in depth. Excavation for stormwater detention facilities, track drains, traction power substations, and utility relocations would also require excavations up to 15 feet deep.

Figure 4 shows construction of the Portland streetcar system. Typically, two lanes of traffic (or parking and one lane of traffic) would be closed during construction. The estimated construction period for the South Lake Union Streetcar is 12-18 months.

Figure 4: Construction of the Portland Streetcar System